

Mastercam X

QUICK REFERENCE CARD

Function	Keyboard shortcut	Toolbar icon	Function	Keyboard shortcut	Toolbar icon
Gview–Top	Alt + 1		Copy to clipboard	Ctrl + C	
Gview–Front	Alt + 2		Regenerate screen	Shift + Ctrl + R	
Gview–Right	Alt + 5		Paste from clipboard	Ctrl + V	
Gview–Isometric	Alt + 7		Cut to clipboard	Ctrl + X	
AutoSave	Alt + A		Redo an event that has been undone	Ctrl + Y	
Run C-Hook or user app	Alt + C		Zoom with window selection	F1	
Set drafting global options	Alt + D		Fit geometry to screen	Alt + F1	
Hide entities	Alt + E		Unzoom by 50%	F2, Alt + F2	
Selection grid options	Alt + G		Repaint	F3	
Online help	Alt + H		Analyze entities	F4	
Show/hide Operations Manager pane	Alt + O		Exit Mastercam	Alt + F4	
Previous view	Alt + P		Delete	F5	
Shading on/off	Alt + S		Configure Mastercam	Alt + F8	
Show/hide displayed toolpaths	Alt + T		Show/hide coordinate axes	F9	
Undo the last creation or event	Alt + U, Ctrl + U, Ctrl + Z		Show all axes (world view, Cplane, Tplane)	Alt + F9	
Mastercam version, SIM serial number	Alt + V		Pan	Arrow keys	
Set main color/level/style/width from entity	Alt + X		Rotate	Alt + Arrow keys	
Level Manager	Alt + Z		Zoom/unzoom by 5%	Page Up, Page Down	
Select all	Ctrl + A				

Note: These keyboard shortcuts are not active if the cursor is inside the Operations Manager.

Customizing Mastercam

► Create your own keyboard shortcuts.

Choose **Settings > Key mappings** from the menu to define your own keyboard shortcuts. Add to or redefine the above list.

- Save sets of shortcuts to different key map files (.KMP) and load them as needed.
- Choose **Reset All** to restore the shortcuts listed above.
- Open or print the .KMP file in any text editor to see which shortcuts have been defined for your workstation.

► Change toolbar layouts.

Choose **Settings > Customize** from the menu to customize the standard toolbars. Remove or rearrange icons and add new Mastercam functions to the toolbars or drop-down menus.

- Name sets of toolbars and save them to different toolbar files (.MTB) and load them as needed. Use the Machine Definition Manager to link them to machine definitions, so when a machine is loaded the proper toolbars appear.
- Choose **Toolbar states** to hide or display toolbars.

A toolbar *layout* is which buttons are on which toolbar. The toolbar *state* is which toolbars are displayed and where.

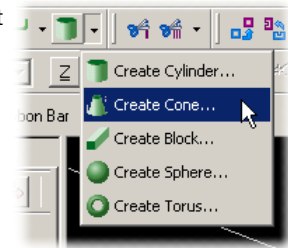
► Customize the right-click menu.

Right-click in the graphics window to see a list of commonly used functions. Choose **Settings > Customize** to add your own functions to this menu. The list of functions is saved in your .MTB file.

► Use drop-down menus.

Use drop-down menus to present many related functions in a very small space. Choose **Settings > Customize > Drop-downs** tab.

- Add or remove functions from existing drop-down menus.
- Click on a menu and drag it to a toolbar to place it.
- Right-click in the drop-down list to create a new, blank menu or rename an existing one.



Selecting geometry

The **General Selection** ribbon bar is what you will often use to select geometry. It will be automatically activated by many Mastercam functions that use it, or you can use it to “pre-select” entities. In other words, use it to select entities, then choose a Mastercam function to apply to them. It is typically used when you are deleting, transforming, or changing the attributes of geometry. Different sets of buttons let you select wireframe or solid geometry.

Selection masks. Set selection criteria. Choose from **Only** the entities that match, or choose **All** matching entities.

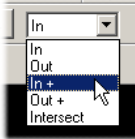
Standard selection mode. Click on an entity to select it or drag a selection window. Shift-click to select a chain. Shift-click again to terminate a partial chain. Alt-click to drag a selection vector.



Selecting multiple entities.

Choose a selection method from the list to quickly select groups of entities.

- Chain.** Select entities which form a continuous contour.
- Window.** Click and drag a rectangle to select all the entities inside it. Choose how entities on the boundary will be included.
- Polygon.** Draw an irregular shape and select all the entities inside it. Choose from the same boundary options as for Window selection.
- Single.** Select one entity at a time.
- Area selection.** Search for and select entities inside a closed boundary.
- Vector.** Click and drag a line to select all entities which intersect it. Create an irregular shape or compound vector by clicking at each corner; double-click when you are done.



Solid selection. Activates solid selection mode...

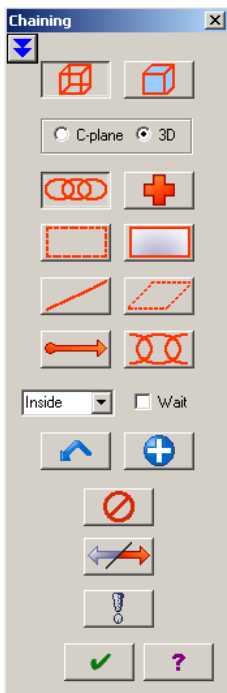


...to select **edges, faces, or solid bodies.**

- Select from back.** Select edges or faces that are hidden from view. Lets you select them without rotating the part on the screen.
- Select last.** Reselects the solid selection from the previous operation.

Use the following tools in all selection modes:

- Verify selection.** When many entities are close together, use this mode to have Mastercam highlight them one after another. Click when the one you want is displayed.
- Cancel selection.** Unselect all entities.
- End selection.** Confirm that you have finished selecting and continue with the active function.



Tip: Choose **Settings>Customize** to assign these selection modes to hot keys or the right-click menu.

Chaining geometry

The Chaining dialog box (left) displays automatically when you need to select *chains* of entities. These are sets of entities which are linked by common endpoints and which have a direction. If you select multiple entities that aren't continuous, Mastercam will simply create multiple chains. You will use this most often when creating toolpaths, where the tool direction equals the chain direction.

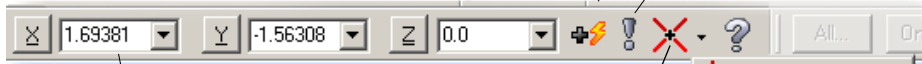
Chaining modes:

- | | | |
|--|---|--|
| Chain wireframe geometry. | <input type="radio"/> C-plane <input checked="" type="radio"/> 3D | Cancel selection. Works one chain at a time. |
| Chain edges or faces of solids. | C-plane. Chain entities in the same plane as first chained entity. | Reverse chain direction. |
| Enable dynamic start & end point selection. | 3D. Manually select when multiple entities share an endpoint. | Access advanced options and settings. |
| Regular chaining. Select all continuous entities. | Chain a single point. Useful for creating entry or exit points. | Re-select chain from previous operation. |
| Draw window and chain all entities inside it. | Chain all entities inside a closed boundary. | End current chain and begin another. (Only used in certain modes.) |
| Create a chain from a single entity. | Draw a polygon and chain all entities inside. | |
| Draw a vector (simple or compound) and chain all entities intersecting it. | Partial chaining. Select first and last entity and chain everything in between. Use Wait option to retrace geometry. | |

AutoCursor

AutoCursor is automatically activated whenever you need to specify a location in the graphics window. The most common use of AutoCursor is when creating geometry. Use AutoCursor to “snap” to key geometry positions, sketch points in space, or to simply type coordinate positions. Use whichever method is easiest for the current operation.

- Fastpoint mode.** Simply type the coordinate position and hit **Enter**.
- AutoCursor settings.** Tell Mastercam what kinds of locations you want to snap to.

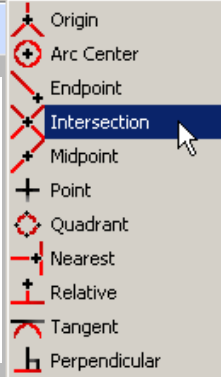


Type **X**, **Y**, or **Z** to enter a single coordinate directly in the field.

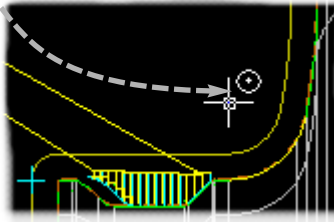
- Click the **X**, **Y**, or **Z** button to **lock** the field.
- Click to select a recently used value.
- Press **Tab** to move to another field.

Override settings. To select a single location relative to an entity, choose the type of location from this list, then click on the entity in the graphics window.

Tip: You can assign these selection modes to hot keys or the right-click menu in the graphics window. Choose **Settings > Customize**.



- Origin
- Arc center
- Endpoint
- Intersection
- Midpoint
- Point
- Quadrant
- Nearest entity



AutoCursor cues

Sometimes when there are many entities close together, it can be difficult to know what points AutoCursor is locking to. AutoCursor uses the icons at left to tell you what kind of location it is snapping to. In this example, the icon tells you that the location is the center point of an arc.

AutoCursor tips:

- Press the [Spacebar] to enter Fastpoint mode.
- Hold the [Ctrl] key to temporarily release all snap settings and free-sketch point locations.
- Shift-click a location to enter relative coordinates.

Double-click the AutoCursor to undock it, or drag it anywhere in the window. You can close it, and Mastercam will automatically display it again when it is needed.

Data entry shortcuts

Use these shortcuts in virtually any numeric data entry field.

► Built-in calculator

Fields that take number values have a built-in calculator. You can enter simple formulas directly in the field and Mastercam will input the value. For example, type **9/32** in a field and Mastercam will display the value **0.28125**.

- You can perform addition, subtraction, multiplication, division, and use parentheses to create more complicated expressions.
- If the field takes an integer instead of floating-point number, Mastercam will discard the decimal portion of the result.

► Automatic inch/metric conversion

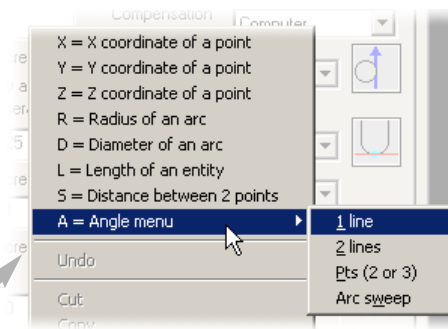
You can also automatically convert inch/metric values. When working in inch mode, type a metric value followed by **mm** and Mastercam will automatically convert it. In metric mode, follow an inch measurement with **in** to convert it.

► Reading values from geometry

Mastercam can also read dimensions, coordinate positions, and other values directly from geometry in the graphics window. For example, type **x** in a field and press either **Tab** or **Enter**. Mastercam returns you to the graphics window to select a point or entity location, and reads the X coordinate directly into the field.

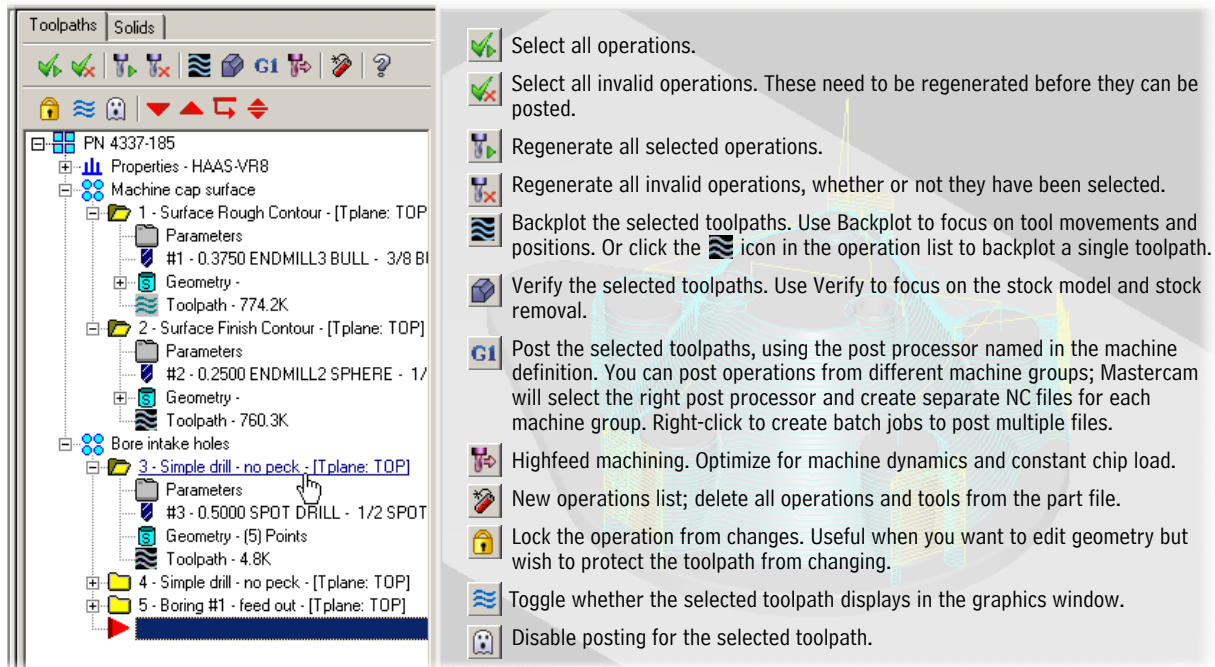
- Right-click in the field or type **?** to see the complete list of shortcuts.
- Select a shortcut from the menu or type the hot key.

Type this... and get this



Toolpath Manager

The **Toolpath** and **Solids Managers** share the pane on the left side of your window. Use them to review, edit, and manage toolpath and solid operations. Together, they are also known as the **Operations Manager**. Drag the border to resize it, or press [Alt+O] to hide it completely. Most functions will work on multiple operations if more than one are selected.



Machine groups

Each machine group is associated with a machine definition, which also includes the control definition and post processor:

Properties - HAAS-VR8

Use the **Properties** sections to perform most job setup work. You can select how to apply tool and operation defaults, create stock models and safety zones, and select a material.

You can also select a different machine, and have Mastercam automatically validate operations against it. Drag toolpaths to a different group to also trigger the automatic validation.

Click on Properties and select **Files** to make job-specific edits to the machine or control definition, or to select a different post. Any changes can only be saved to the part file, and cannot be written to the machine definition on your hard disk.

Toolpath groups

Use toolpath groups as a convenient way to select, move, and post logical sets of operations. Toolpath groups are subgroups of a parent machine group and inherit all of its properties. They can also be nested. Use the right-click menu (**Groups, New Toolpath group**) to create them.

Using the insertion point

The insertion point shows where the next operation will be placed. It also determines the active machine and control definition.

- Move the insertion point up or down.
- Position the insertion point immediately after the currently selected operation.
- Automatically scroll the Toolpath Manager so that the insertion point is visible. Useful when you have many operations in the list.

TIPS & SHORTCUTS

Use the following hot keys:

- E** Expand or collapse all operations.
- G** Set parent group of selected operation as the active group.
- L** Lock or unlock selected operations.
- P** Toggle posting on selected operations.
- T** Toggle toolpath display for selected operations.
- Ctrl+C, Ctrl+X** Copy or cut one or more selected operations to the clipboard.
- Ctrl+V** Paste operations at the insertion point.

Working with geometry

Click on one of the above icons to edit or reselect the geometry for an operation. You can also add new geometry, reverse the chaining direction, and sort drill points.

Toolpath uses wireframe geometry.

Toolpath uses solids or surfaces. This icon expands to let you individually select drive/check surfaces, containment boundaries, and start points.

Click a geometry icon and drag it to another toolpath to use it in that toolpath.

Extensive right-click menu lets you:

- Create new machine and toolpath groups.
- Choose **Select** to select operations which match your criteria, such as the same tool.
- Sort or renumber operations and tools.
- Choose **Display options** to customize the labels for operations and properties.
- Recalculate/update feeds and speeds when you change the stock material.
- Import/export operations from a library. Drag geometry icons from current operations to the imported ones.
- Create and run batch jobs to post many operations from multiple part files.
- Create job setup sheets.
- Run collision/gouge check utilities.

Solids Manager

The **Solids Manager** lists all of the solid operations in your Mastercam file. Each solid body is listed separately; expand each one to see the list of solid operations used to create it. Edit or change the settings for an operation or reselect the geometry to make changes to the solid body. Solid operations that have been changed need to be regenerated.

Note: The Solids Manager is available when you purchase Mastercam Solids. Users without Mastercam Solids can still import and machine solids; however, they cannot create or edit them.

Use this button to quickly regenerate all invalid operations. This is useful when you have made changes to geometry that affect many operations.

Click the **Select** button and then select a face or feature of your solid model. Mastercam automatically highlights the solid operation that created it.

Use cursor keys to quickly move around:

- **Up** and **Down** move one line at a time. **Page Up** and **Page Down** move one screen at a time.
- **Left** and **Right** expand/condense the selected operation.

Click on an operation to select it. Mastercam highlights the feature in your part model.

- Click on **Parameters** to edit the operation settings.
- Click on **Geometry** to reselect the geometry.

Mastercam automatically lists all the toolpath operations in the part file that machine the solid body.

Drag the **Stop Op** icon to prevent Mastercam from generating operations which follow it. Use it to preview your solid at different stages, without deleting and recreating operations.

Tip: When you create new solid operations, Mastercam inserts them before the **Stop Op** icon.

Right-click a solid body to change its color or other attributes, check it for errors, or create a duplicate.

Indicates a solid body. Also used in Toolpath Manager when machining a solid.

Operation needs to be regenerated. This typically appears right after you've changed the parameters or geometry for an operation.

Operation is invalid, and Mastercam cannot generate the solid. Try adjusting the parameters or geometry and regenerating.

The end of the operation list for a solid.

A toolpath has been created that machines the solid.

Extrude, loft, or sweep operation.

Revolve operation.

Fillet operation.

Chamfer operation.

Draft faces (tilt the faces by a defined angle).

Trim solid faces.

Create a shell from the solid.

Indicates a Boolean solid operation. Boolean operations involve combining, subtracting, or working with the intersection of several solids.

Identifies the *tool* solid in a Boolean operation. Since the tool solid is typically discarded as part of the operation, Mastercam places the solid operations in which the tool body was originally generated under this icon, so that you can examine or recreate the tool solid if necessary.

Consult the online help that comes with Mastercam to learn more about Boolean solid operations.

Working with imported solids

Imported solid models are listed in the Solids Manager as a *brick*, meaning that you cannot access any of the operations used to create it:






Modify the brick with new solid operations just like any other solid. These will be listed in the solids tree normally.



- Right-click on the solid and choose **Check solid** to check the imported model for errors or irregularities that might cause later problems.
- Right-click on the solid and choose **Solids > Find features** to re-create hole and fillet operations for the brick, which can then be edited or deleted.



You can also use **Mastercam Direct** inside your 3rd-party solid modeling program, which preserves a solid's history when it is brought into Mastercam.


Backplotting toolpaths


Use the **Backplot** feature to precisely examine individual tool moves. Click the  button in the Toolpath Manager toolbar to backplot toolpaths.

  **Play** toolpath continuously, or **stop/pause**.


  Advance/rewind toolpath to next conditional stop (see right).

  Advance/rewind toolpath to next step or move.

 Display entire toolpath at once.

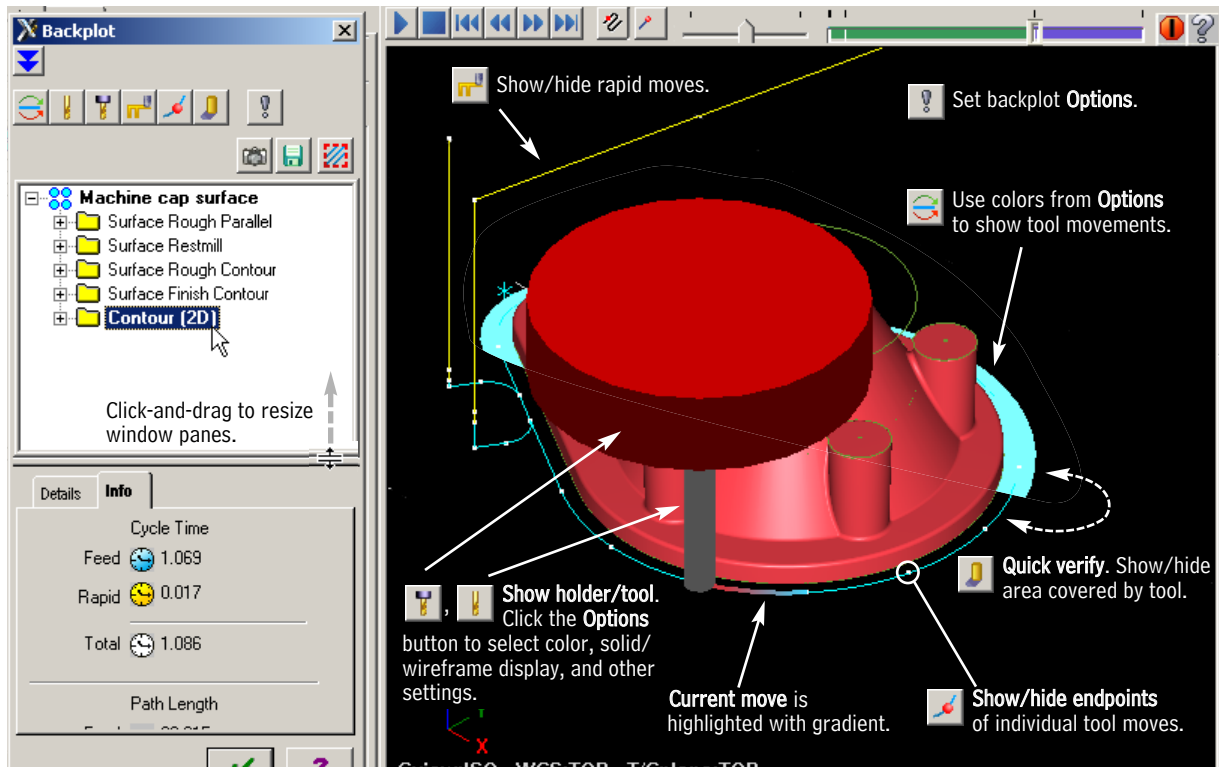
 Display one move at a time.

Drag to control playback speed.

 **Conditional stops.** Tell Mastercam to pause the toolpath at a predetermined step, coordinate position, tool change, or new operation.

Slide the bar to advance the toolpath. Click on a location to jump to that tool position. Click the slider to activate the mouse wheel for advance and rewind.


- Colored areas show tool changes.
- White bars indicate new operations.
- Black tic marks indicate conditional stops.



Selecting toolpaths

Select multiple toolpaths in the Toolpath Manager to load them. While in the Backplot window:

- Click the group name to backplot all toolpaths in the group.
- Click an individual toolpath to backplot it by itself.
- Open a toolpath to backplot individual toolpath segments.


Click the  button to isolate a section of geometry and see all the toolpath moves which affect it.


Hotkeys



- S** Step forward one move at a time.
- B** Move back one move.
- R** Toggle continuous run mode.
- P** Go back to previous stop.
- N** Advance to next stop.



Toolpath information

 **Details** Click this tab to see information about the current toolpath move. See the type of move, coordinates, feed rate, and cutter compensation direction (for comp in control).

 **Info** Click this tab to see cycle time and path length for the toolpaths or segments currently backplotting.

Click the  button to save the toolpath as geometry, or click the  button to save the tool geometry. You will be prompted to select a level to keep it separate from the part geometry.